

Ch – 2 Inverse Trigonometric Functions

Definition, range, domain, principal value branch. Graphs of inverse trigonometric functions.

47. The following table gives the inverse trigonometric function (principal value branches) along with their **domains** and **ranges**:

Functions	Domain	Range (Principal Value Branches)
$y = \sin^{-1} x$	$[-1, 1]$	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
$y = \cos^{-1} x$	$[-1, 1]$	$[0, \pi]$
$y = \tan^{-1} x$	R	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
$y = \cot^{-1} x$	R	$(0, \pi)$
$y = \operatorname{cosec}^{-1} x$	$R - (-1, 1)$	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$
$y = \sec^{-1} x$	$R - (-1, 1)$	$[0, \pi] - \left\{\frac{\pi}{2}\right\}$

48.

$\sin^{-1} \frac{1}{x} = \operatorname{cosec}^{-1} x, x \in R - (-1, 1)$	$\sin^{-1}(-x) = -\sin^{-1} x, x \in [-1, 1]$
$\cos^{-1} \frac{1}{x} = \sec^{-1} x, x \in R - (-1, 1)$	$\tan^{-1}(-x) = -\tan^{-1} x, x \in R$
$\tan^{-1} \frac{1}{x} = \cot^{-1} x, x > 0$	$\operatorname{cosec}^{-1}(-x) = -\operatorname{cosec}^{-1} x, x \geq 1$
$\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, x \in [-1, 1]$	$\cos^{-1}(-x) = \pi - \cos^{-1} x, x \in [-1, 1]$
$\operatorname{cosec}^{-1} x + \sec^{-1} x = \frac{\pi}{2}, x \geq 1$	$\sec^{-1}(-x) = \pi - \sec^{-1} x, x \geq 1$
$\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}, x \in R$	$\cot^{-1}(-x) = \pi - \cot^{-1} x, x \in R$